

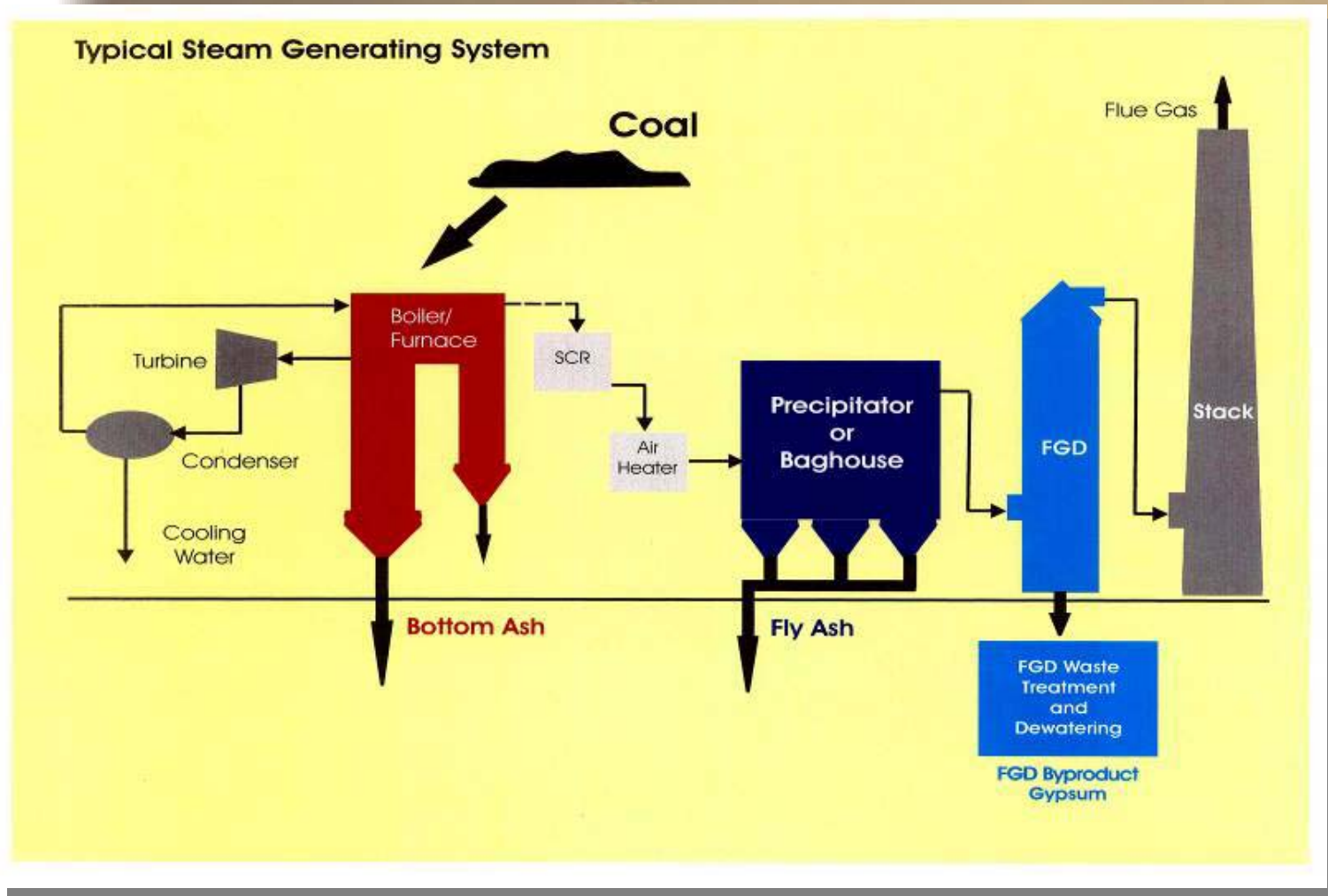
Coal Combustion Products (CCP) Basics

**Presentation to the EPA OSW Staff
January 23, 2007**



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Where Do CCPs Come From?



CCPs Include Coal Ashes, Etc.

- ∞ CCPs are the residuals from the combustion of coal and include:
 - Fly ash
 - Bottom ash and boiler slag
 - Air emission control system residues
- ∞ Although “Ash” and “CCPs” are terms often used interchangeably, CCPs is the industry preferred terminology



Fly Ash

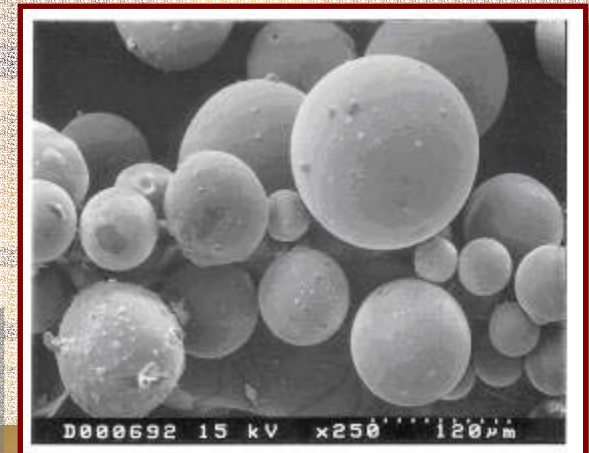
- ∞ Fine particles like flour or talc
- ∞ Exhibits “pozzolanic” characteristics
 - Siliceous or siliceous and aluminous materials, when in the presence of water, react with calcium hydroxide to produce cementitious properties
- ∞ Besides natural ash, there are two types
 - ∞ Class F normally from bituminous coal
 - ∞ Class C normally from sub-bituminous coal
 - ∞ Either Class can come from lignite or bituminous or sub bituminous



What Makes FA Useful?



- ∞ Non-hazardous nature
- ∞ Mineralogical components allow it to be used in lieu of other natural materials
- ∞ Spherical shape
- ∞ Easily transportable
- ∞ Can be conveyed in dry or in moistened form



Beneficial Rules of Thumb

- ∞ For each ton of fly ash used instead of portland cement, a ton of CO₂ can be avoided
 - The production of portland cement emits approximately one ton of CO₂ for each ton produced
- ∞ Conserves natural resources and reduces need for landfill space
- ∞ Fly ash is typically less expensive than portland cement



Leading Use for Fly Ash

- ∞ Additive to concrete as a replacement for portland cement
 - Enhances durability
 - Reduces permeability
 - Improves workability
- ∞ Can reduce costs of construction
- ∞ Contributes to more sustainable building practices (LEED, Green Globes)



Materials From Air Emission Control Systems

- ∞ Flue gas is scrubbed before leaving the stack to remove sulfur and nitrogen oxides
 - “Wet” processes such as flue gas desulfurization (FGD)
 - “Dry” process such as spray dryers
 - Other FGD technologies
- ∞ Other ways to scrub – selective and non-selective catalytic reduction (uses ammonia)



FGD Process Factors

∞ Negative:

- May add or commingle residues with fly ash to make product non-saleable

∞ Positive:

- Can provide high quality synthetic gypsum, that has many uses and is comparable in quality to natural mined gypsum



Synthetic (FGD) Gypsum

- ∞ Approximately 8 million tons (67%) of FGD gypsum is recycled each year
- ∞ 27% of the wallboard produced annually uses FGD gypsum exclusively

Quantities anticipated to grow significantly in next decade



Potential FGD Markets in Agribusiness

- ∞ Substantial research demonstrates value of using FGD gypsum in many soil situations
- ∞ Can add micronutrients to deficient soils
- ∞ Improves soil drainage and root growth
- ∞ Can be used in both till and no-till applications
- ∞ Especially valuable in the southeastern US where soil conditions respond very favorably to FGD gypsum

Industry Goals

- ∞ EPA, DOE and industry have set the goal of 50% utilization of all CCPs by the year 2011
 - 40% utilization in 2005
- ∞ Historically both production and beneficial use have increased each year in the last ten
- ∞ Challenges coming from a large number of new scrubbers planned, new plants being constructed and implementation of CAIR and CAMR

Questions?

- ∞ More information available from our website
 - www.ACAA-USA.org
- ∞ The C2P2 website
 - www.EPA.gov/epaoswer/osw/conserv/c2p2/
- ∞ DOE website
 - www.NETL.DOE.gov
- ∞ Several FHWA related websites (RMRC; Turner-Fairbank, FHWA, etc.)

Thank You



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